



United States Department of the Interior

BUREAU OF RECLAMATION
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MAY 16 2012

IN REPLY REFER TO:

MP-740
ENV-8.00

Mr. Jim Martin
Engineering Geologist
Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670

Subject: Bureau of Reclamation Quarterly Activity and Monitoring Report -
January 1, to March 31, 2012

Dear Mr. Martin:

Please find enclosed the *Quarterly Activity and Monitoring Report* for the first quarter of 2012. The report summarizes Reclamation's activities relative to its salinity control plan and fulfills the quarterly reporting requirement in the Management Agency Agreement.

We value the contribution and continued collaboration from your agency as we strive to address the salinity issues in the San Joaquin River. If you have any questions, please contact Mr. Michael Mosley at 916-978-5119 or mmosley@usbr.gov.

Sincerely,

Jobaid Kabir
Chief, Decision and Analysis

Enclosure

Quarterly Activity and Monitoring Report

January 1 – March 31, 2012

*In compliance with the “Management Agency Agreement between the
Central Valley Regional Water Quality Control Board and the United States
Bureau of Reclamation” executed on December 22, 2008*

May 15, 2012

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Abbreviations and Acronyms

Action Plan	Actions to Address the Salinity and Boron TMDL Issues for the Lower San Joaquin River November 2010
ARRA	American Recovery and Reinvestment Act of 2009
Authority	San Luis & Delta-Mendota Water Authority
Basin Plan	Water Quality Control Plan for the Sacramento and San Joaquin River Basins, 4 th Edition
BMP	Best Management Practices
BO	Biological Opinion
CALFED	CALFED Bay-Delta Program
CCID	Central California Irrigation District
CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
CVO	Central Valley Operations
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CV Water Board	Central Valley Water Board
CV-SALTS	Central Valley Salinity Alternatives for Long Term Sustainability
DCRT	Data Collection and Review Team
DMC	Delta-Mendota Canal
DWR	California Department of Water Resources
EC	electrical conductivity
GBP	Grassland Bypass Project
GDA	Grassland Drainage Area
GRCD	Grassland Resource Conservation District
GWD	Grassland Water District
Interior	U.S. Department of the Interior
LSJR	Lower San Joaquin River
MAA	Management Agency Agreement
µS/cm	micro Siemens per centimeter
µg/L	microgram(s) per liter (parts per billion)
mg/L	milligram(s) per liter (parts per million)

Reclamation	Bureau of Reclamation
RTMP	Real Time Management Program
Secretary	Secretary of the Interior
Service	U.S. Fish and Wildlife Service
SJR	San Joaquin River
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TDS	total dissolved solids
TMDL	total maximum daily load
USBR	US Bureau of Reclamation
VAMP	Vernalis Adaptive Management Plan
WAP	Water Acquisition Program
WARMF	Watershed Analysis Risk Management Framework
WCFSP	Water Conservation Field Service Program
WDR	Waste Discharge Requirement
WQO	water quality objective
WEAP	Water Evaluation and Planning System
WRDP	Westside Regional Drainage Plan
WSI	Water Supply Index
WWQM	Wetland Water Quality Model
YSI	Yellow Springs Instrument Company

Purpose

The Central Valley Regional Water Quality Control Board's (CV WATER BOARD) Salt and Boron Total Maximum Daily Load (TMDL) was approved and placed into effect on July 28, 2006. In response to the Salinity and Boron TMDL, the United States Bureau of Reclamation (Reclamation) developed the salinity management plan, *Actions to Address the Salinity and Boron TMDL Issues for the Lower San Joaquin River* (Action Plan) and entered into a Management Agency Agreement (MAA) with the CV WATER BOARD on December 22, 2008. The MAA describes the actions Reclamation will take to meet the obligations allocated to it by the Salinity and Boron TMDL for the Lower San Joaquin River. The MAA states:

Reclamation will submit quarterly reports to the Regional Water Board by 45 days after the end of the calendar quarter. The quarterly reports will include a summary of activities conducted by Reclamation during the quarter in conjunction with each element included in their Action Plan, including activities related to developing a Real Time Management Program. In addition Reclamation will include data collected relevant to DMC load evaluation.

The "Quarterly Activity and Monitoring Report" summarizes the activities conducted by Reclamation in conjunction with each element outlined in its salinity control plan for the Lower San Joaquin River. The Action Plan describes Reclamation's past, current and planned practices and procedures to mitigate and manage adverse impacts of salt and boron imported into the San Joaquin Basin via the Delta Mendota Canal (DMC) in order to help achieve compliance with the objectives contained in the CV WATER BOARD's *Water Quality Control Plan for the Sacramento River and the San Joaquin River Basins – 4th Edition* (Basin Plan).

Organization of Quarterly Report

The quarterly report provides a synopsis of the various activities associated with each element identified in the Action Plan. The Action Plan describes the actions contemplated by Reclamation to implement the MAA. Action categories include Flow, Salt Load Reduction, and Mitigation. For each action a brief description and list of activities are identified. The quarterly report includes calculations of salt loads based on DMC deliveries and calculations of assimilative capacity provided through dilution flows. The calculation methods used in this report are provisional and some elements in this report do not include estimations of benefits at this time. Reclamation submitted the *Compliance Monitoring and Evaluation Plan* to the CV WATER BOARD (USBR 2010) which outlines the criteria and methodology for determining DMC loads and credits.

A. Flow Actions

Reclamation agreed to provide mitigation and dilution flows to meet the Vernalis salinity and boron objectives. Historically, Reclamation has provided dilution flows from the New Melones Project and through purchases for the Vernalis Adaptive Management Plan (VAMP). Flow actions include: dilution flows from New Melones Reservoir, water acquisitions, and recirculation.

1. New Melones Reservoir Operations – Provision of Dilution Flow

Brief Description: In the Flood Control Act of October, 1962, the Congress reauthorized and expanded the New Melones project (P.L. 87-874) to a multipurpose unit to be built by the U.S. Army Corps of Engineers (Corps) and operated by the Secretary of Interior as part of the Central Valley Project (CVP), thus creating the New Melones Unit. The multipurpose objectives of the unit include flood control, irrigation, municipal and industrial water supply, power generation, fishery enhancement, water quality improvement, and recreation. Since June of 2009, New Melones has been operated to meet the National Marine Fisheries Service Biological Opinion (BO) to Reclamation on the effects of the continued operation of the CVP and the California State Water Project (SWP) on the various runs of Chinook salmon, Central Valley steelhead, and green sturgeon, and their designated critical habitat.

Items 12 and 13 of the Control Program for Salt and Boron Discharges into the Lower San Joaquin River of the Basin Plan Amendment state:

12. Salt loads in water discharged into the Lower San Joaquin River (LSJR) or its tributaries for the express purpose of providing dilution flow are not subject to load limits described in this control program if the discharge:

- a. complies with salinity water quality objectives for the LSJR at the Airport Way Bridge near Vernalis;
- b. is not a discharge from irrigated lands; and
- c. is not provided as a water supply to be consumptively used upstream of the San Joaquin River at the Airport Way Bridge near Vernalis.

13. Entities providing dilution flows, as described in item 12, will obtain an allocation equal to the salt load assimilative capacity provided by this flow. This dilution flow allocation can be used to:

- 1) offset salt loads discharged by this entity in excess of any allocation or; 2) trade, as described in item 10. The additional dilution flow allocation provided by dilution flows will be calculated as described in Table IV-8 (CV WATER BOARD 2004c).

Activities

- *Operated system to comply with Biological Opinions and Ripon dissolved oxygen criteria.*

Quantification Methodology: Table IV-8 (CV WATER BOARD 2004c) states that dilution flow allocations are calculated as follows:

$$A_{dil} = Q_{dil} * (C_{dil} - WQO) * 0.8293$$

Where:

- A_{dil} = dilution flow allocation in thousand tons¹ of salt per month
 Q_{dil} = dilution flow volume in thousand acre-feet per month (TAF) – above base flows
 C_{dil} = dilution flow electrical conductivity (EC) in micro-seimens per centimeter ($\mu\text{S}/\text{cm}$)
 WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in $\mu\text{S}/\text{cm}$

Table 1 lists data and monthly calculations for the past quarter. Data for flow releases from Goodwin Dam, the Stanislaus River “design flows,” and salinity at Orange Blossom Bridge are used to calculate the monthly dilution flow allocations. The water-year type is estimated based on the 75% probability of exceedance found in California Department of Water Resources (DWR) Water Supply Index Forecasts (<http://cdec.water.ca.gov/cgi-progs/iodir/WSI>) for the San Joaquin Valley. The 75% exceedance forecast for May 1, 2012 is 2.2, which classifies 2012 as a dry year.

Dilution Flow Allocation: WY2012 classified as a dry year.

Table 1: Goodwin Dam Monthly Dilution Flow Allocation

	Goodwin Dam Flow (GDF) ^a TAF	Base Design Flow (DF) ^b TAF	Q_{dil} , TAF GDF-DF= Q_{dil}	WQO^c , $\mu\text{S}/\text{cm}$	C_{dil} (monthly average EC at Orange Blossom Bridge) ^d , $\mu\text{S}/\text{cm}$	Dilution Flow Allocation, A_{dil} , tons
Jan-12	37	12	25	1000	68	-19,333
Feb-12	26	19	7	1000	73	-5,383
Mar-12	19	17	2	1000	74	-1,535

Source: USBR 2012a

^a <http://www.usbr.gov/mp/cvo/reports.html>

^b USBR 2010 Compliance Monitoring and Evaluation Plan

^c CV WATER BOARD 2004a and 2004b Appendix 1: Technical TMDL Report

^d <http://cdec.water.ca.gov/cgi-progs/staSearch>

2. Water Acquisitions

Brief Description: The Central Valley Project Improvement Act (CVPIA) signed into law on October 30, 1992, modified priorities for managing water resources of the CVP. CVPIA altered the management of the CVP to make fish and wildlife protection, restoration, and enhancement as project purposes having equal priority with agriculture, municipal and industrial, and power uses. To meet water acquisition needs under CVPIA, the U.S. Department of the Interior (Interior) developed a Water Acquisition Program (WAP), a joint effort by Reclamation and the

¹ This is a typographical error in the Basin Plan Amendment. The units are actually tons.

U.S. Fish and Wildlife Service (Service). The program's purpose is to acquire water supplies to meet the habitat restoration and enhancement goals of the CVPIA and to improve Interior's ability to meet regulatory water quality requirements. Under the Basin Plan Amendment, performance of the VAMP spring pulse flow does not provide dilution flows, so it is not reported here.

Activities

- *Reclamation executed a one year extension of the San Joaquin River Agreement which provided fall flows for 2011.*
- *Reclamation did not acquire any water this quarter.*

Quantification Methodology: The discussion on dilution flow allocation presented under New Melones Reservoir Operations is pertinent here as well. Table IV-8 (CV WATER BOARD 2004c) states that dilution flow allocations are calculated as follows:

$$A_{dil} = Q_{dil} * (C_{dil} - WQO) * 0.8293$$

Where:

- A_{dil} = dilution flow allocation in thousand tons² of salt per month
- Q_{dil} = dilution flow volume in thousand acre-feet per month
- C_{dil} = dilution flow electrical conductivity in $\mu\text{S}/\text{cm}$
- WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in $\mu\text{S}/\text{cm}$

3. DMC Recirculation Pilot Studies – Provision of Dilution Water

Brief Description: The DMC Recirculation Project studied the feasibility of using CVP flows to provide dilution water for salinity management. As part of the project studies, Reclamation conducted three pilot recirculation studies in 2004, 2007, and 2008. The pilot studies pumped water from the Delta at Tracy and conveyed it through the DMC to the Newman Wasteway, where it is then conveyed to the Lower San Joaquin River. The “Delta-Mendota Canal Recirculation Feasibility Study, Plan Formulation Report” is complete and available at <http://www.usbr.gov/mp/dmcrecirc/docs/final/index.html>.

Activities

- *Reclamation participated in a State Water Resources Control Board (SWRCB) workshop to inform the Board on the results of the DMC Recirculation Feasibility Study on March 15, 2011.*

B. Salt Load Reduction Actions

Reclamation is under a court order to provide drainage to its San Luis Unit, on the Westside of the Lower San Joaquin Valley. As part of this effort, Reclamation has historically supported the

² *ibid*

Westside Regional Drainage Plan (WRDP) through grants and in-kind services. Salt Load Reduction Actions include the Grassland Bypass Project (GBP), implementation of the WRDP, and the following conservation programs: Water Conservation Field Services Program (WCFSP), WaterSMART Program (formerly Water 2025 Grants Program), and the CALFED Bay-Delta Water Use Efficiency Program.

1. Grassland Bypass Project

Brief Description: The GBP is a multi-agency stakeholder project based upon the 2009 Use Agreement³ between the Reclamation and the San Luis and Delta-Mendota Water Authority (Authority) to manage and reduce the volume of agricultural drainage water produced within the 97,000 acre Grassland Drainage Area (GDA), and to use a 28-mile segment of the San Luis Drain to convey it to Mud Slough, a tributary of the San Joaquin River. The GBP has removed agricultural drainage water from wetland water supply conveyance channels, facilitated drainage management that maintains the viability of agriculture in the GDA, and promoted continuous improvement in water quality in the San Joaquin River.

Activities

- *The Grassland Area Farmers met the 2012 annual load limits for salts specified in the Use Agreement and have met the monthly limits for January – March 2012.*
- *Flows from the GDA did not exceed the capacity of the San Luis Drain through displacement across the San Joaquin River Water Quality Improvement Project re-use area.*
- *Reclamation and the Grassland Area Farmers continue to assist CV WATER BOARD staff with the development of a revised Waste Discharge Requirement (WDR) for the GBP.*
- *Reclamation continues to implement the monitoring requirements for the 2001 WDR. Reclamation collected and analyzed water samples from nine sites for selenium, boron, salts, nutrients, and molybdenum, and operated auto-samplers in the San Luis Drain and in the river at Crows Landing.*
- *The Interagency Data Collection and Review Team (DCRT) continues to implement the monitoring program that includes quarterly biota sampling at seven locations, acute and chronic toxicity analyses, flow and water quality monitoring, and sediment monitoring for the accumulation of selenium. The DCRT will revise the GBP monitoring program to be consistent with the revised WDR and 2009 Use Agreement.*
- *The DCRT completed most of the 2010 report, pending biological analyses; and all data for 2011 have been compiled.*
- *The DCRT will revise the environmental monitoring program based on scientific requirements and the new WDR.*
- *On November 9, 2011, six environmental groups, lead by the Pacific Coast Federation of Fishermen's Associations, sued Reclamation and the Authority for failure to comply with the Clean Water Act permit system and to halt operation of the GBP. The first session will occur in late April 2012.*

³ U.S. Bureau of Reclamation and the San Luis and Delta-Mendota Water Authority, December 22, 2009. Agreement for Continued Use of the San Luis Drain for the Period January 1, 2010 through December 31, 2019. Agreement No. 10-WC-20-3975

2. Westside Regional Drainage Plan

Brief Description: The WRDP is a local stakeholder program developed by integrating all consistent elements of drainage management developed by government and local agencies and private partnerships. The original efforts of the WRDP focused on reducing selenium discharges to the San Joaquin River. Success of the original effort prompted a proposal to expand the WRDP to go beyond regulatory requirements and eliminate selenium, boron, and salt discharges to the San Joaquin River, while maintaining productivity of agriculture lands in the solution area and enhancing water supplies for the region.

While Reclamation lacks control of many of the resources needed to be an active participant in the WRDP, Reclamation provides annual grant funding to develop the WRDP.

Activities

- *Reclamation continues to negotiate a long-term agreement with Panoche Drainage District to treat and dispose of high saline groundwater in six sumps that currently discharge into the DMC. This will reduce the load of salts delivered to the Mendota Pool, Grasslands wetlands, irrigated lands, and lower San Joaquin River.*
- *Reclamation continues to administer two grants with Panoche Drainage District to implement the WRDP for construction of infrastructure, source control activities, and environmental mitigation. A new grant for \$4.2 million is being negotiated.*
- *The grants have assisted Panoche Drainage District to displace waterborne salts and boron; 2012 results are pending.*

3. Conservation Efforts

Brief Description: The water use efficiency program includes several grant programs which fund actions to assure efficient use of existing and any new water supplies. Efficiency actions can alter the pattern of water diversions and reduce the magnitude of diversions, providing additional benefits. Efficiency actions can also result in reduced discharge of effluent or drainage and improve water quality. Although Reclamation is unable to quantify the benefits of the various funded projects as related to salinity reduction, the following information is provided to depict the agency's water conservation efforts in the basin. Through WaterSMART and the CALFED Bay-Delta Restoration program Reclamation has awarded 82 projects in the San Joaquin Valley that required performance measures since 2006. As information is collected from these projects, quantifiable benefits may be determined in the future.

Activities

Under the 2012 Bay-Delta Restoration Program: Agriculture Water Conservation and Efficiency Grants, Reclamation awarded four projects:

- *Tulare Irrigation District, Canal Modernization Project, Phase II, Reclamation Funding: \$467,200, Total Project Cost: \$934,400. The district will install flow measurement and automated delivery devices at the headworks of Packwood Creek, Evans Canal and regulating basins within the district. The project will improve water management*

capabilities within the district's canal system and facilitate flexibility to meet grower irrigation demands. The project will reduce system spills and is expected to save 1,355 acre-feet of water annually.

- *Firebaugh Canal Water District, Second Lift Canal Lining Project, Phase III, Reclamation Funding: \$500,000, Total Project Cost: \$2,150,000. The project will allow concrete lining of 2.2 miles of earthen canal to prevent seepage, as well as eliminate high sediment loads in delivered water. By decreasing suspended silts, growers can reduce the back flushing and filtering needed for efficient farm irrigation systems such as drip, or sub-surface, drip irrigation. Through reductions in seepage, the project is expected to conserve 485 acre-feet of water annually.*
- *Central California Irrigation District, East Ditch Reservoir and Santa Rita Canal Reservoir Project, Reclamation Funding: \$1,000,000, Total Project Cost: \$3,700,000. The proposed project will construct two regulating reservoirs to capture operational spills and drain water from canals. The reservoirs will provide mid-stream storage to hold the captured water and release it back into the irrigation system as needed, improving delivery flexibility and providing more precise control of irrigation flows. The project is expected to conserve 12,000 acre-feet of water annually.*
- *Henry Miller Reclamation District, Lower Arroyo Canal Modernization Project, Reclamation Funding: \$117,532, Total Project Cost: \$239,350. The project will install five long crested weirs on the Lower Arroyo Canal. The weirs precisely control canal water levels and help prevent system spills. Installing the weirs will reduce water level fluctuations, providing more constant deliveries to improve reliability and flexibility of deliveries to growers. It will also promote accurate measuring and water accounting. The project is expected to conserve 4,750 acre-feet of water annually.*

Under the 2012 WaterSMART Water and Energy Efficiency Program, Reclamation awarded three projects within the San Joaquin basin as follows:

- *Delhi County Water District, received \$500,000 (\$1,485,000 over 3 years) for their Water Conservation, Energy Efficiency & BioGas Production Project. The Delhi County Water District, near Turlock, California, will install a biogas collection system at its existing wastewater treatment facility. The improvements will allow the recovery of between 20,000 and 40,000 cubic feet of methane-rich biogas each day, or roughly 300 gasoline equivalent gallons of biogas per day for use as a compressed natural gas transportation fuel or for use in power generation. In addition, the project includes construction of a pipeline and pumping system to deliver treated water for use at a nearby sod farm. The project is expected to result in water savings of 701 acre-feet annually by replacing water currently supplied through other sources. Total Project Cost: \$3,332,693*
- *Kaweah Delta Water Conservation District, received \$400,000 (\$800,000 over 2 years) for their Packwood Creek Water Conservation Project. The Kaweah Delta Water Conservation District, in Tulare County, California, will install four new automated check structures and will automate an existing check structure at Packwood Creek. The project will allow for increased quantities of otherwise unstorable storm and flood waters to be delivered to existing basins for ground water recharge. The project is expected to*

result in the better management of approximately 29,360 acre-feet of water annually. The project also includes restoration of Valley Oak riparian forest habitat near the site, which is expected to benefit a number of endangered species. Total Project Cost: \$1,610,866

- Pixley Irrigation District received \$750,000 (\$1,500,000 over 3 years) for their Gravity Conveyance and Conservation Project. The Pixley Irrigation District in Tulare County, California, will work with the Lower Tule Irrigation District to increase the capacity of the existing Casa Blanca Canal and also construct a new 7.5-mile canal. Together, those improvements will facilitate the increased delivery of surplus water and flood flows and will also address current seepage losses. Once completed, the project is expected to result in water savings of approximately 9,850 acre-feet annually, and avoid the need to use groundwater in most cases. Total Project Cost: \$4,362,375*

Under the 2012 CALFED Water Use Efficiency Program, Reclamation awarded two projects within the San Joaquin Basin.

- Cawelo Water District, \$1 million – The Calloway Canal Lining Project proposes to line approximately 3,523 linear feet of existing earthen canal from Coffee Road to Rosedale Highway. The project will conserve 2,910 AFY.*
- Merced Irrigation District, \$1 million – The McCoy Lateral Rehabilitation and Atwater Drain Bypass Project will help reduce operational discharges of irrigation water generated by the 1900 and Tin Flume Laterals from spilling into the Atwater Drain, by creating a bypass system. The project will also reline and enlarge a portion of the McCoy Lateral. The project will conserve 2,561 AFY.*

C. Mitigation Actions

Reclamation's Action Plan identifies two mitigation actions to reduce salinity loads: (1) a Real Time Management Program (RTMP) to improve the timing of west-side discharge of saline drainage to the San Joaquin River so as to occur during times of sufficient San Joaquin River assimilative capacity. (2) Implementation of innovative wetland best management practices (BMP) for salinity – these could include early drawdown and re-flooding during years of water surplus; delayed wetland drawdown (cannot be practiced on the same land two years in a row without damaging wetland habitat) and recirculation of wetland drainage. Reclamation actively supports the development of a real time monitoring and salt assimilative capacity forecasting program in the San Joaquin River and in managed seasonal wetlands.

1. RTMP – Development of Stakeholder-Driven Program

Brief Description: The RTMP is described in the TMDL as a stakeholder driven effort to use “real-time” water quality and flow monitoring data to support water management operations in order to maximize the use of assimilative capacity in the San Joaquin River. The CV WATER BOARD describes this assimilative capacity as up to 85% of the load determined by Vernalis salinity objective. Reclamation is working with its consultant and Berkeley National Laboratory to support the development of a stakeholder-driven program.

Activities

- *Reclamation continues working with its consultants to facilitate stakeholder involvement in developing a RTMP. The RTMP team is evaluating options and opportunities for engaging stakeholders through participation in the Central Valley Salinity Alternatives for Long Term Sustainability (CVSALTS) and the Lower San Joaquin River Committee within the larger CVSALTS effort.*
- *During the first quarter of FY 2012, Reclamation developed the proposed process and milestones for meeting the 2014 salt and boron TMDL compliance date. Reclamation and the CV Water Board meet monthly to discuss their combined efforts.*
- *To fully manage salt loading, a full-scale, stakeholder-driven RTMP must be implemented. Reclamation and GWD have worked together for over 10 years on the installation of monitoring stations throughout the GRCD. Now as partners, they are ready to complete the RTMP pilot scale project. The project will demonstrate how RTMP may be set up, use of forecast and management models, how the program evolves, how data must be managed, and how operational practices manage salt loading into the LSJR. The monitoring data will assist in verifying operational practices that manage surface water runoff and potentially the leaching of salt to groundwater. The management techniques will improve water conservation, manage salt loads to the LSJR, and reduce impacts to water quality for wildlife and agricultural operations.*
- *The pilot project is a proposed two-year study which will monitor and report the volume of water, as well as salt load, of all major water sources entering the wetlands of the GRCD, key inter-conveyance points of mixing, deliveries to state federal and private wetlands, and all major outflows draining from the region to the LSJR. The real time publically available web enabled data will be used to provide decision support to wetland and water managers to maximize water conservation and water quality delivered within the GRCD.*
- *The pilot study is the design phase for the development of models that emulate the behavior of the system– the model will be validated during this phase and a decision framework identified. GWD will work closely with the Reclamation’s model developers to ensure assumptions, data input, and proof of concept are meaningful. Reclamation with GWD’s help intends to develop the following:*
 - *Develop Forecast Model-for the San Joaquin River Assimilative Capacity*
 - *Develop Management Model with Visual Support System*
 - *Develop Engine for Model to improve ability of the model*
 - *Develop GUI Interface and Visual Support for Model to provide enhanced graphics.*
- *The real-time water quality management system under development for the GWD and the State and Federal refuges serves as a useful prototype for the basin-wide system. Many of the same issues of data sharing and coordination are also relevant to the agricultural watersheds and between water districts.*
- *The ftp data transfer issues between NIVIS and WISKI have almost been resolved. The most time consuming part has been developing the “Exchange Number” equivalency in WISKI. This requires reviewing each monitoring site by every parameter to make sure*

each is properly described in the new database. This work is almost complete. Once implemented, WISKI will bin the data exported from NIVIS every 15 minutes and, using a tool called KiDAT, move the data into the WISKI database. Once the data has been migrated and updated in WISKI the data will be filtered using some of the automated data screening and correction tools in WISKI. The GIS-wetland drainage conceptual modeling approach using WEAP proved to be too awkward in dealing with water quality. Therefore, a new approach is being taken along the lines of the earlier Wetland Water Quality Model (WWQM) – which is to develop the model data engine in Microsoft Excel and Access. This will provide a more efficient means of dealing with the time series data and make the model more accessible. Wetland water supply conveyance and drainage maps and the assignment of delivery and drainage canals to wetland subareas are being checked for errors with the assistance of the GWD. A prototype user interface has been developed and will be presented to GWD for their feedback and review. The intent is to develop a decision support tool for the wetland entities that can be used to schedule salt loading to the San Joaquin River.

2. RTMP – Technical Support

Brief Description: A successful RTMP will require a real time monitoring network and a model capable of forecasting San Joaquin River assimilative capacity. The concept behind the RTMP is to enable the use of available assimilative capacity to export salt loads from the basin and to improve the scheduling of salinity loading to the river at times when there is significant dilution capacity. Matching salt load export with river assimilative capacity will reduce the frequency with which the river's capacity for salinity is exceeded (to the extent that exceedances are caused by discharges and not by background or allowed loads). Development of an accurate forecast model will serve as a decision making tool to help manage salinity loads in the river without violating water quality standards. Reclamation is committed to participate in the development and support of these tools. Reclamation staff has valuable experience in both of these areas. The technical support of this program will follow the stakeholder process.

Activities

- *Reclamation is working with its contractors to gather the necessary information to identify general infrastructure needs to engage real time management stakeholders. This study is scheduled to be completed later this year.*
- *Berkeley National Laboratory and Reclamation are working closely with Systech Water Resources and the US Geological Survey to improve the resolution of the current surface and groundwater simulation models by redefining watersheds to match water districts on the west-side of the San Joaquin Basin and improving automation of data assimilation for real-time forecasting.*

3. Wetlands BMP Plan

The California Department of Fish and Game (CDFG) and the Grassland Resource Conservation District (GRCD) in coordination with Reclamation are developing BMP plans to reduce the impact of discharges from managed wetlands into the San Joaquin River. Reclamation also provides resources to support the development of a real-time monitoring network and other

potential BMP analysis tools within Federal, State, and private managed wetlands. At present, the BMP plan has not been completed and released to the public.

Activities

- *Reclamation is developing a plan to continue support a network of real-time flow and water quality monitoring stations at both wetland pond sites and major inflow and outflow conveyances within the GRCD. Reclamation (MP-400) has supported this work for the past 3 ½ years; budget cuts and a realignment of programs has forced a transition to funding out of the water acquisitions program. Reclamation continues to sponsor research to reduce the per-unit cost of telemetered monitoring and web-access of real-time data. Reclamation has installed two MACE Agriflow data collection platforms adjacent to the monitoring wells at the Volta pump well sites. Reclamation will be working with MACE Inc. to test a new low-cost telemetry system during the next quarter.*
- *Reclamation is working with the Service, CDFG, and local wetlands managers to update and finalize the BMP Plan. During 2009 and 2010 new flow and water quality monitors came on-line which are quantifying the volume and quality of return flows into the District from Central California Irrigation District (CCID) and the San Luis Canal Water District. This quantification will improve water management in the South GWD and improve water use efficiency.*
- *Pumping at the two Volta wells ceased at the end of February 2012 with pumping objectives for 2012 fulfilled. Pumping rates will ramp up during the wetland flooded season in late 2012/2013. Summary reports are being prepared for the 2011/2012 Volta pumping program and should be available next quarter. Well discharge and EC sensors reported data directly to the current YSI-EcoNet sensor network. Problems with flow sensor stability (due to faulty well valve design) will be addressed prior to fall flood-up.*

4. Participation in CV-SALTS Program

Brief Description: The CV WATER BOARD and SWRCB initiated a comprehensive effort to address salinity problems in California's Central Valley and adopt long-term solutions that will lead to enhanced water quality and economic sustainability. The CV-SALTS is a collaborative basin planning effort aimed at developing and implementing a comprehensive salinity management program. The goal of CV-SALTS is to maintain a healthy environment and a good quality of life for all Californians by protecting the state's most essential and vulnerable resource - water.

Activities

Reclamation continues to participate in various sub-committees of the program (Executive, Technical Advisory and Economic, Education and Outreach, and Lower San Joaquin). In addition:

- *Reclamation continues to lead the Technical Subcommittee and regularly attends the Executive Committee Policy and Management Practices subcommittee meetings. Reclamation is participating with the CV WATER BOARD in the analysis of the basin plan; potential changes may be pursued as projects.*

- *Reclamation's consultants continue to make progress on the Westside Salt Sources Assessment, which complements the CV-SALTS Pilot Salt Sources Study. This effort includes assistance in updating the WESTSIM and WARMF-SJR models, improvements to model calibration and development of a spreadsheet-based model, and summary of water and salinity budgets for agricultural and wetland uses on the west-side.*
- *The Westside Salt Sources Assessment. The integration of the surface water and ground water models continues to be problematic. However, Reclamation is documenting the approach and lessons learned to help the future study teams. The Westside Water Budget Technical Memorandum is anticipated to be released to the CVSALTS Technical Committee in June 2012.*
- *Reclamation partnered with CV-SALTS and the Lower San Joaquin River Committee as they evaluate beneficial use designations and potential modification of the Basin Plan. Reclamation will assist in the development of quality plans, a Stakeholder Participation Plan, and a process for Real-time Management.*

D. Central Valley Project Deliveries Load Calculation

Brief Description: The CVP delivers water to both the Grassland and Northwest subareas (as described in the Basin Plan) through the DMC. The DMC starts at the pumping headworks in the Delta, the C.W. Jones Pumping Plant at Tracy, California. Water is conveyed south to Check 13 near Santa Nella, California, where water is either mixed with the State Water Project in O'Neill Forebay and then either pumped into San Luis Reservoir for later delivery, or conveyed further south to the canal terminus at the Mendota Pool. Groundwater and river water are pumped into the DMC at several locations. "Reach 1" of the DMC is located between the Jones Pumping Plant and Check 13. "Reach 2" of the DMC includes turnouts between the Check 13 and the Mendota Pool. "Reach 3" covers deliveries made out of the Mendota Pool. Some simplification of this system has been made for accounting purposes, as some districts take portions of their deliveries through several turnouts.

Quantification Methodology: The Basin Plan allocates a load to Reclamation for water delivered to the Grassland and Northwest side Subareas. This load allocation is calculated according to Table IV-8 Summary of Allocations and Credits (CV WATER BOARD 2004c):

$$LA_{DMC} = Q_{DMC} * 52 \text{ mg/L} * 0.00136$$

Where:

- LA_{DMC} = Load Allocation of salts, in tons
 Q_{DMC} = monthly amount of water delivered to Grassland and Northwest side subareas, in acre - feet
 52 = "background" total dissolved solids (TDS) of water in the San Joaquin River at Friant per the Basin Plan
 0.00136 = factor for converting units into tons

Actual DMC salt loads are calculated by the following equation:

$$L_{DMC} = Q_{DMC} * (C_{DMC}) * 0.00136$$

Where:

- L_{DMC} = Actual DMC Load, in tons
 Q_{DMC} = monthly amount of water delivered to Grassland and Northwest side subareas, in acre - feet
 C_{DMC} = monthly average (arithmetic mean) of salinity of the water delivered to Grassland and Northwest Subareas, in mg/L TDS
0.00136 = factor for converting units into tons

Each delivery reach's Q_{DMC} is calculated and then paired with the associated monthly average TDS for that reach, so the equation essentially becomes:

$$L_{DMC} = 0.00136 * \Sigma(Q_{DMC} * C_{DMC})_{\text{Reach 1-3}}$$

This equation is then broken into two calculations, one for each subarea. Table 2 illustrates the excess loads from the subareas and the total excess loads from CVP deliveries.

Table 2. Calculation of DMC Allocations and Loads

	Grassland Subarea						Northwest Subarea					Total
	San Joaquin River and Mendota Pool Deliveries from CVP, load in thousand tons	Delta- Mendota Canal Deliveries from CVP, load in thousand tons	San Luis and Cross Valley Canal Deliveries from CVP, load in thousand tons	Total Flow, thousand acre-feet	Load Allocation, thousand tons	Actual Load - Load Allocation, thousand tons	San Joaquin River and Mendota Pool Deliveries from CVP, load in thousand tons	Delta- Mendota Canal Deliveries from CVP, load in thousand tons	Total Flow, thousand acre-feet	Load Allocation, thousand tons	Actual Load - Load Allocation, thousand tons	Total Excess Load from CVP Deliveries, thousand tons
September to March Standard, 1000 $\mu\text{S}/\text{cm}$												
Jan-11	8.7	0.2	0.6	5.6	0.4	9.2	0.03	0.01	0.08	0.01	0.03	9.2
Feb-11	17.4	1.9	2.3	22.9	1.6	20.0	0.8	0.5	4.1	0.3	1.1	21.1
Mar-11	13.5	3.5	2.5	23.1	1.6	17.9	1.1	0.4	4.7	0.3	1.1	19.0
April to September Standard, 700 $\mu\text{S}/\text{cm}$												
Apr-11	17.6	2.2	2.2	22.6	1.6	20.5	1.6	1.1	9.7	0.7	2.0	22.5
May-11	29.7	7.0	3.1	49.8	3.5	36.3	2.7	2.3	18.3	1.3	3.7	40.0
Jun-11	31.4	5.4	4.4	49.0	3.5	37.8	2.6	1.9	18.7	1.3	3.3	41.0
Jul-11	34.8	7.6	5.1	86.9	6.1	41.3	3.2	3.8	31.9	2.3	4.8	46.1
Aug-11	36.3	10.5	4.3	80.0	5.6	45.4	3.4	3.5	28.1	2.0	5.0	50.4
September to March Standard, 1000 $\mu\text{S}/\text{cm}$												
Sep-11	23.8	10.2	1.7	66.9	4.7	30.9	1.7	1.8	13.7	1.0	2.5	33.4
Oct-11	18.4	3.7	1.2	33.3	2.4	21.1	1.0	0.6	5.9	0.4	1.2	22.3
Nov-11	8.6	4.9	1.5	28.2	2.0	13.1	0.6	0.4	3.5	0.2	0.8	13.9
Dec-11	0.9	9.0	1.1	26.5	1.9	9.1	0.02	1.1	2.9	0.2	0.9	9.9
Jan-12	6.9	9.1	4.1	37.4	2.6	17.5	0.1	1.6	2.9	0.2	1.5	18.9
Feb-12	43.1	12.0	8.1	105.7	7.5	55.8	3.8	2.9	11.1	0.8	5.9	61.6
Mar-12	24.0	5.1	6.0	49.1	3.5	31.6	2.1	1.9	6.0	0.4	3.7	35.3

Source: USBR 2012b

E. Reporting Requirements

In the MAA, Reclamation agreed to provide quarterly reports to the CV WATER BOARD. Reclamation will consult with the CV WATER BOARD before proposing any changes to the sample report format. Quarterly reports are due 45 days after the end of the calendar quarter:

Table 3. Quarterly Report Submission Schedule

End of Calendar Quarter	Due Date of Quarterly Report
March 31, 2012	May 15, 2012
June 30, 2012	August 14, 2012
September 30, 2012	November 14, 2012
December 31, 2012	February 14, 2013

F. Funding Reporting

Reclamation agreed in the MAA to seek additional funding, including grant funding, to support salinity control efforts. Table 4 summarizes Reclamation's funding initiatives.

Activities

Table 4. Program Funding Initiatives

Program	Description	Status	Period of Performance
Program to Meet Standards	Salinity Objectives for Vernalis	Execution	FY 2012 - FY2014
Program to Meet Standards	Salinity Objectives for Vernalis	Modification for Optional Tasks	FY2013 - FY2014
Real-Time Management Program	Stakeholder Facilitation to Initiate RTMP	Execution	FY 2012 - FY 2013
Real-Time Management Program	Technical Support, Data Analysis, and Infrastructure Study	Execution	FY 2012 - FY 2013
Westside Salt Assessment	Fate and Transport Study	Execution	FY2012 - FY2013
Salinity Control	Salinity and Boron TMDL	Execution	FY 2012
Salinity Control	Westside Regional Drainage Plan	Complete	FY2012-FY2013
Salinity Control	Grasslands Bypass Project	Requested Funding	FY2012-2013
Cooperative Agreement for a Pilot Study	Grassland Resource Conservation District Real Time Management Program Pilot Study	Requested Funding	September 1, 2012 - September 31, 2014

G. References

CV WATER BOARD 2004a	Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges Into the Lower San Joaquin River Draft Final Staff Report Appendix 1: Technical TMDL Report , Regional Water Quality Control Board Central Valley Region, July 4, 2004.
CV WATER BOARD 2004b	Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges into the Lower San Joaquin River Final Draft Staff Report. Appendix D: Background Salt and Boron Loading, Appendix E: Alternate Methods For Calculating Salt Loading from the Northwest Side of the Lower San Joaquin River. Regional Water Quality Control Board Central Valley Region, July 4, 2004.
CV WATER BOARD 2004c	Amendments to The Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for The Control of Salt and Boron Discharges into the Lower San Joaquin River Final Staff Report. Table IV-8 Summary of Allocations and Credits, Dilution Flow Allocations , Regional Water Quality Control Board Central Valley Region, September 10, 2004
USBR 2010	Compliance Monitoring and Evaluation Plan, In Compliance with the "Management Agency Agreement between the Central Valley Regional Water Quality Control Board and the Bureau of Reclamation" executed on December 22, 2008. US Bureau of Reclamation, November 2010.
USBR 2012a	Calculations for Quarterly Report, Q1-2012, Table 1: Goodwin Dam Monthly Dilution Flow Allocations, US Bureau of Reclamation, May 15, 2012.
USBR 2012b	Delta-Mendota Canal Water Quality Monitoring Program Report for January through March 2012. US Bureau of Reclamation, Draft April 13, 2012.